PCT/JP2003/013795

Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference FWA3-29	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/JP2003/013795	International filing date (*day/month/year*) 28 October 2003 (28.10.2003)	Priority date (*day/month/year*) 28 October 2002 (28.10.2002)
International Patent Classification (IPC) or national classification and IPC D01F 9/127, 9/133, C01B 31/02		
Applicant BUSSAN NANOTECH RESERCH INSTITUTE INC.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

   a. ☐ *(sent to the applicant and to the International Bureau)* a total of _____ sheets, as follows:

      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- ☒ Box No. I Basis of the report
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand 20 May 2004 (20.05.2004)	Date of completion of this report 27 January 2005 (27.01.2005)
Name and mailing address of the IPEA/JP Facsimile No.	Authorized officer Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/JP2003/013795

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language _____, which is language of a translation furnished for the purpose of:

☐ international search (under Rules 12.3 and 23.1(b))

☐ publication of the international application (under Rule 12.4)

☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☒ The international application as originally filed/furnished

☐ the description:

pages _____, as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☐ the claims:

pages _____, as originally filed/furnished

pages* _____, as amended (together with any statement) under Article 19

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☐ the drawings:

pages _____, as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/JP 03/13795

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	3, 9-11, 13, 15-18	YES
	Claims	1, 2, 4-8, 12, 14	NO
Inventive step (IS)	Claims	15, 16	YES
	Claims	1-14, 17, 18	NO
Industrial applicability (IA)	Claims	1-18	YES
	Claims		NO

2. Citations and explanations

Document 1: JP 2-259120 A (Asahi Chemical Ind. Co., Ltd.), 19 October 1990, page 3, upper right column, line 16 to page 4, upper left column, line 13

Document 2: JP 2002-194625 A (Nikkiso Co., Ltd.), 10 July 2002, entire text

Document 3: JP 8-60444 A (Showa Denko Kabushiki Kaisha), 05 March 1996, paragraphs [0004] and [0016], and fig. 1

Document 4: JP 8-60446 A (Showa Denko Kabushiki Kaisha), 05 March 1996, entire text

Document 5: JP 49-92326 A (Takasago Kagaku Kabushiki Kaisha), 03 September 1974, entire text

Document 6: JP 4-139013 A (Yazaki Corp.), 13 May 1992, entire text

The inventions that are set forth in claims 1, 2, 5-8, 12 and 14 are disclosed in document 1 cited in the international search report; therefore, they lack novelty and do not involve an inventive step.

Document 1 discloses a feature wherein carbon fibers formed by means of vapor phase growth, which have substances attached to the surface thereof, are heated in an inert gas atmosphere in order to sublimate and remove

the substances that are attached to the surface thereof; a feature wherein the heating temperature is between 500-1300°C; a circulation-type heating device that comprises a tubular electric furnace as the heating mechanism, wherein the carbon fibers are continuously supplied to the core barrel of the furnace by means of a screw, a belt conveyer, a pusher or the like while an inert gas is supplied to the carbon fibers in a counter-current flow; and a feature wherein the forms such as the fiber openings or the like of the heated carbon fibers are adjusted. Furthermore, document 1 indicates that it is possible to use prior art methods for transporting a powder, i.e. transport by means of a gas, transport by means of a screw or a belt conveyor, pushing by means of a pusher or the like, as the method for delivering the supply of carbon fibers to the heating mechanism.

The inventions that are set forth in claims 3, 4, 9-11, 13, 17 and 18 do not involve an inventive step in the light of document 1.

With regards to claim 3, a person skilled in the art could optimize the bulk density of the powder, as appropriate.

With regards to claim 4, the feature of further graphitizing the carbon fibers is well known.

With regards to claims 9 and 10, document 1 discloses the feature of transporting the carbon fibers by means of a gas. Furthermore, it would be easy for a person skilled in the art to adjust the flow rate and the pressure of the gas, to provide a gas tank for storing the gas, and to carry out the abovementioned adjustments by means of a switch valve, at that time.

With regards to claim 11, it would be easy for a person skilled in the art to conceive of providing a recovery device for recovering the heated carbon fibers and a trap device for trapping the components within the

exhaust gas to the heating device that is disclosed in document 1.

With regards to claim 13, a person skilled in the art could configure so that the heating furnace is arranged vertically, and so that the carbon fibers are transported via sliding due to the force of gravity, as appropriate.

With regards to claims 17 and 18, document 1 (comparative example 1) indicates that the diameter of the vapor phase-grown carbon fibers that are heated is 0.05μm. Therein, a person skilled in the art could optimize the apparent density of the carbon fibers, as appropriate.

The inventions that are set forth in claims 1, 4 and 5 are disclosed in document 2 cited in the international search report; therefore, they lack novelty and do not involve an inventive step.

Document 2 discloses a feature wherein the vapor phase-grown carbon fibers that are discharged by the reaction furnace are collected by means of filaments, transported to a heat treating furnace and subjected to a heat treatment; and indicates that the heat treatment is implemented by means of a heat treating furnace for removing organic compounds and a heat treating furnace for forming graphite, which exhibit heat treatment temperatures of 400-1200°C and 200-3,000°C, respectively.

The inventions that are set forth in claims 7, 11, 12, 17 and 18 do not involve an inventive step in the light of document 2.

With regards to claim 7, document 2 discloses a heat-treating furnace which is equipped with mechanisms for introducing and removing a non-oxidizing gas. Therein, a person skilled in the art could optimize the positioning of the mechanism, as appropriate.

With regards to claim 11, document 1 discloses the feature of providing a recovery container for recovering

the heat-treated carbon fibers. Therein, it would be easy for a person skilled in the art to conceive of providing a trap device for trapping the components within the exhaust gas.

With regards to claim 12, tubular or cylindrical heat treating furnaces are commonly used.

With regards to claims 17 and 18, the diameters of the vapor phase-grown carbon fibers are within a conventionally specified range. Therein, a person skilled in the art could optimize the apparent density of the carbon fibers, as appropriate.

The invention that is set forth in claims 15 and 16 is not disclosed in any of the documents that are cited in the international search report, and is not obvious to a person skilled in the art.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/JP2003/013795

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

Application No. Patent No.	Publication date *(day/month/year)*	Filing date *(day/month/year)*	Priority date (valid claim) *(day/month/year)*
JP 2003-201630 A [E, X]	18 July 2003 (18.07.2003)	26 December 2001 (26.12.2001)	

2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure	Date of non-written disclosure *(day/month/year)*	Date of written disclosure referring to non-written disclosure *(day/month/year)*